European Journal of Cardio-Thoracic Surgery 46 (2014) 152
doi:10.1093/ejcts/ezt468 Advance Access publication 18 September 2013

LETTER TO THE EDITOR

Reduced amount of gaseous microemboli in the arterial line of minimized extracorporeal circulation systems compared with conventional extracorporeal circulation

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Received 26 June 2013; accepted 19 August 2013

Keywords: MECC • Venous line pressures • Gaseous microemboli • Venous bubble traps • Arterial line filters

We would like to refer to the recently published article by Aboud *et al*. [1] regarding negative venous line pressures and increased arterial air bubble count during minimized extracorporeal circulation (MECC). We think that there are several flaws in this paper.

Recent studies have mainly focussed on gaseous microemboli (GME). Approaches are manifold, using arterial line filters, or additionally, venous bubble traps (VBTs) [2]. Roosenhoff *et al*. [3] showed a significant reduction of GMEs after the VBT. Kutschka *et al*. [4] showed a nearly complete reduction of GME post-arterial line filter. Perthel *et al*. [5] proved the relationship between reduced GME in the arterial line of MECC and a decreased emboli rate, demonstrated by transcranial ultrasound. In clinical terms, Anastasiadis *et al*. [6] proved that patients operated on MECC showed a clearly better postoperative neurocognitive course.

After implementation of VBTs, our study group in Coswig focused on venous suction and took several measures: a small triple-stage venous cannula and use of a double purse-string suture to firmly fix the cannula. Furthermore, since 2007, in Coswig, we have been using a controlled negative-pressure approach. This, translated into clinical practice, means a continuous measuring of venous suction pressure with integrated regulation of arterial flow. There is also an ongoing study in Coswig focusing on GME regarding MECC vs conventional extracorporeal circulation.

Moreover, the authors focused on one type of the MECC system. In fact, there are several different oxygenators that handle microbubbles in a different way. In the present study, the authors chose the worst possible combination, components which should most probably not be used for MECC perfusion. Most modern oxygenators have integrated bubble traps (Affinity Fusion) or an integrated arterial filter (Capiox FX). The best available MECC circuit may integrate these components, because they demonstrate practically no GME activity even at higher negative pressures. In general, every modern MECC circuit is negative pressure limited in terms of the operator being able to determine the maximal negative pressure—which is certainly never as high as −150 mmHg.

Finally, MECC perfusions are always performed with a minimal positive right atrial pressure. However, the smaller the pump, the more negative will be the pressure. In the present study, the authors used the smallest available pump.

In any case, in the era of the modern MECC systems and the routine use of real-time control of negative pressure to the venous line and VBT to all systems, we think that this paper is out-of-date. Moreover, the advice for further refinements of the systems to avoid adverse effects from increased arterial air bubbles is a rather misleading conclusion and may not refer to the systems, which are used in contemporary clinical practice.

In summary, we would like to point out that despite the notable effort that the authors have made, the long-time interval between implementing their study and publishing their results suggests that advances in MECC technology and technique did not find enough consideration in the study design, and hence, we have to consider the entire work as not state-of-the-art.

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